much valuable time which I could ill spare, but the introduction of inequalities of long period into the expression of the Moon's longitude which are not necessary is a serious matter, and I have thought it desirable at all events to call attention to what I believe is a case in point.

On a supposed Periodical Term in the Values found for the Coefficient of the Parallactic Inequality. By E. Neison, Esq.

When Sir G. Airy determined the correction to the value of the parallactic inequality, he contented himself with applying a constant correction for error of semi-diameter for each of the two periods 1751–1815, and 1815–1839. But in the investigation undertaken by Mr. Campbell and myself, this was thought insufficient, and it was judged better to apply to each group of observations the correction to the tabular semi-diameter derived from the observations made during the same period. And it was shown that the values of the parallactic inequality when thus corrected strongly indicated the existence of a periodical term with a period of about forty-five years.

It is now objected that these corrections to the semi-diameter of the Moon exhibit a similar periodical term, and the conclusion is drawn that the term shown by the values of the parallactic inequality may have been introduced through the application of these corrections to the semi-diameter, and so be fictitious.

It became necessary to investigate this point.

To establish this objection it is not merely sufficient to show that there exists a periodical inequality in the correction applied for errors of semi-diameter, not even if it be shown that this inequality has a similar period; but it is imperative to show that in the correction applied for error of semi-diameter, there exists an inequality of the same value, period, and epoch as that found in the values of the parallactic inequality, and that when this inequality is eliminated from the corrections applied for errors of semi-diameter, the inequality also disappears from the values found for the parallactic inequality. Nothing less than this will serve to establish the conclusion it has been sought to draw.

From Sir G. Airy's reduction of the Greenwich observations ("Reduction of the Greenwich Lunar Observations," vol. i. pages lxiv-lxv) are derived the following corrections to the tabular semi-diameter of the Moon, divided into the same groups as those used for determining the correction to the parallactic inequality, and for convenience they have been expressed in terms of the same unit as employed by Sir George Airy:—

No.	Group.	No. of Obs.	Corr.	No.	Group.	No. of Obs.	Corr.
i.	1750–1759	34	+·684	v.	1769–1778	22	+·608
ii.	1755–1764	29	+·592	vi.	1774–1782	19	+·392
iii.	1760–1768	19	+·560	vii.	1779–1787	17	+·280
iv.	1765–1773	18	+·648	viii.	1783–1791	18	+·300

No.	Group.	No. of Obs.	Corr.	No.	Group.	No. of Obs.	Corr.
ix.	1788–1796	24	+·356	xv.	1816–1824	9	+·408
x.	1792–1801	24	+·472	xvi.	1820–1829	17	+·400
xi.	1797–1805	15	+·464	xvii.	1825–1833	16	+·376
xii.	1802–1808	13	+·472	xviii.	1830–1838	11	+·408
xiii.	1806–1815	12	+·628	xix.	1834–1842	14	+·580
xiv.	1811–1819	8	+·740	xx.	1839–1847	20	+·492

The periodical term in the values of the parallactic inequality was taken as having the approximate value

$$B \cos b = +0{\cdot}300 \cos \{8^\circ \times [T - 1825{\cdot}5]\}.$$

It was then assumed that a similar term existed in the above correction. In this manner each of the above values gave an equation of the form

$$S' + \cos b \times S'' = \text{correction to semi-diameter.}$$

This furnished twenty equations of condition, from which by the method of least squares there was derived the values

$$S' = +{\cdot}490 \pm {\cdot}015; \qquad S'' = -{\cdot}078 \pm {\cdot}022.$$

It was obvious, therefore, that the much greater value derived from the parallactic inequality could not have been introduced through the corrections to the semi-diameter. To render this unquestionable, the effect of this small inequality was altogether eliminated from the above corrections, by applying as the correction to the semi-diameter the quantity

$$\{\text{Correction to semi-diameter} - S'' \times \cos b\}.$$

The resulting values for the parallactic inequality furnished twenty equations of condition from which to determine B by the method of least squares. The result was

$$B = +{\cdot}210 \pm {\cdot}040.$$

Thus, even after every trace of such an inequality had been eliminated from the values of the correction to the semi-diameter, the values of the parallactic inequality gave a coefficient three-fourths as large as before.

In the previous investigation, it was not thought necessary to attempt to attain any minute accuracy, as it was considered sufficient to adopt the first approximate determination of the value and period of this term. But from the first it was pointed out that by slightly altering the period and epochs of maximum, more accurate values could be obtained (see *Monthly Notices*, vol. xl. page 405). The previous investigation showed that the yearly motion of the argument should be slightly diminished, and instead of 8° it would be better to take $7\frac{1}{2}^\circ$. It was assumed, therefore, that the argument was

$$b' = 7\tfrac{1}{2}^\circ \times [T - 1826{\cdot}0],$$

and each value of the correction to the tabular semi-diameter was equated to an expression of the form

$$S' + sS'' + \sin b' S''' + \cos b' S''''.$$

The second term $s\,S''$ was introduced to allow for the effect of any difference which might have been produced in the value of the semi-diameter from the change of instruments in 1816, it being supposed zero after that date. The resulting twenty equations were solved by the method of least squares and gave the following values:—

$$S' = +0{\cdot}528$$
$$S'' = -0{\cdot}017$$
$$S''' = -0{\cdot}109$$
$$S'''' = -0{\cdot}088$$

The periodical term had the form, therefore,

$$= -0{\cdot}140 \cos \{b' - 51^\circ{\cdot}1\}$$
$$= -0{\cdot}140 \cos \{7\tfrac{1}{2}^\circ \times [T - 1832{\cdot}9]\}.$$

It is obvious that this term is in amount far smaller and in epoch very different from that existing in the values of the parallactic inequality.

The effects of this assumed term were now eliminated as before from the correction to the semi-diameter applied to the parallactic inequality. The resulting twenty values of the parallactic inequality were then equated to expressions of the form

$$A + \alpha + B' \sin b' + B'' \cos b',$$

and the resulting equations solved as before. The result was the values

$$A = +0{\cdot}599$$
$$\alpha = -0{\cdot}585$$
$$B' = -0{\cdot}114$$
$$B'' = +0{\cdot}200$$

Hence the periodical term existing in the values of the parallactic inequality, after carefully eliminating any portion introduced through the correction to semi-diameter, is

$$= +0{\cdot}230 \cos \{b + 29^\circ{\cdot}6\}$$
$$= +0{\cdot}230 \cos \{7\tfrac{1}{2}^\circ \times [T - 1822{\cdot}1]\}.$$

This result completely confirms that previously obtained.

It may be remarked that the comparison with observation shows that this adopted period is somewhat too small, and that the observations would be best satisfied by the term

$$= +0{\cdot}240 \cos \{7\tfrac{2}{3}^\circ \times [T - 1824{\cdot}0]\}.$$

Converting into seconds of arc, this becomes

$$= +0''.96 \cos \{7\tfrac{2}{3}° \times [T - 1824.0]\}.$$

It remains now to see how far this value agrees with the results of the Greenwich observations since 1851. We have (*Monthly Notices*, vol. xli. page 262)

1851–1858	(P)	$= -123''.55$
1862–1869		$= -125.09$
1870-1876		$= -125.13$

Then applying the correction for this term, these become

1855.0	(P)	$= -123''.55 - .55B = -124''.08$	
1866.0		$= -125.09 + .79B = -124.33$	(A)
1873.5		$= -125.13 + .94B = -124.23$	

This term, therefore, still brings these three values into thorough accord.

If in obtaining the value for 1855.0, my own results be throughout adopted instead of using the Greenwich value for the correction to the semi-diameter—and this would perhaps be more satisfactory—then the result for this period must be increased by $0''.05$ bringing it up to $-124''.13$ in still better accord.

If the effects of any assumed term in the correction to the semi-diameter be neglected, the value of the term in the parallactic inequality becomes

$$+1''.12 \cos \{7\tfrac{2}{3}° \times [T - 1824.5]\},$$

and the three groups become

1855.0	(P)	$= -123''.55 - .49B = -124''.10$	
1866.0		$= -125.09 + .83B = -124.16$	(B)
1873.5		$= -125.13 + .91B = -124.11$	

These results may be regarded as showing quite clearly that this periodical term exists in the values of the parallactic inequality itself, and are not introduced by the corrections which have been applied for the errors of tabular semi-diameter.

London:
1882, *March* 25.

Addendum, 1882, June 1.—Since the preceding was written it has been shown by Mr. Stone (*Monthly Notices*, page 303) that the correction to Adams's value of the semi-diameter of the Moon, deduced by me from the observations of the years 1853–54–55, requires to be increased by $+0''.78$. As these comprise exactly a third of the total number of observations, the mean from the whole must be increased by $+0''.26$. Hence it

follows that the observed value differs from Adams's value by $+0''\cdot26-0''\cdot01=+0''\cdot25$ (*Monthly Notices*, vol. xlii. page 273).

The reduction of the observed values to the mean value depends on the theoretical expression for the parallax, and the same set of observed values will not necessarily yield the same mean value if reduced by different theoretical expressions for the parallax. The preceding results depend on the restricted expression given in the *Nautical Almanack* for 1856. Had the much more elaborate expression of Hansen's been used, a slightly different value would have been obtained. According to my calculations, the difference amounts to $-0''\cdot15$ (see *Monthly Notices*, xli. page 418). Hence to reduce these earlier results to the same basis as the later ones—*i.e.* Hansen's Tables—the correction to the semi-diameter which should be used is $+0''\cdot25-0''\cdot15=+0''\cdot10$, instead of $-0''\cdot18$, that actually used. The difference $+0''\cdot28$ represents the correction which must be applied to the value of the parallactic inequality found from the observations of the years 1851–1858 (*Monthly Notices*, xli. page 262). Hence the correct value is

$$(P) \quad =-\{123''\cdot55+0''\cdot28\}=-123''\cdot83.$$

Using this value, the comparison (A) of the value of the parallactic inequality for the three periods becomes

1855·0	(P)	$=-123''\cdot83-\cdot55B=-124''\cdot36$	
1866·0		$=-125\cdot09+\cdot79B=-124\cdot33$	(C)
1873·5		$=-125\cdot13+\cdot94B=-124\cdot23$	

These agree better than before.

Remarques à propos des récentes observations de M. Schiaparelli sur la planète Mars. Par le Docteur F. Terby, de Louvain.

En présence des discussions qui surgissent au sujet des remarquables découvertes de M. Schiaparelli, j'ai cru utile de bien préciser, dans une courte notice, quelques faits qui ne devraient point être perdus de vue par les Aréographes et qui ont une importance capitale dans le débat :—

Je ferai d'abord observer que M. Burton, dans une lettre adressée à l'*Astron. Reg.* No. 233, p. 116, dit explicitement avoir *vu* et *identifié* le *Lethes*, l'*Astapus*, l'*Astabaras*, le *Phison*, le *Nilus*, l'*Indus* et l'*Oxus*; d'après cette lettre, il y aurait donc accord complet entre les observations de Loughlinstown et de Milan, du moins pour les canaux précités (v. aussi *Copernicus*, Nos. 16 et 17, pp. 92 et 93).

Je ne sais si M. Proctor, dans sa lettre au *Times*, a mentionné des canaux vus par M. Dawes, autres que ceux qui figurent dans sa carte générale; je crois cela fort peu probable; je puis donc dire que ce serait une profonde erreur de penser que les canaux